U.S. Department of Commerce
Juanita M. Kreps
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards Certificate of Analysis

Standard Reference Material 30f

Cr-V Steel (SAE 6150)

(In cooperation with the American Society for Testing and Materials)

Constituent	C	Mn	P	S *	Si	Cu	Ni	Cr	V	N
Certified[1] Value, % by wt.	0.490	0.79	0.011	0.009	0.283	0.074	0.070	0.945	0.182	0.010
Estimated[2] Uncertainty	0.004	0.01	0.001	0.001	0.004	0.002	0.004	0.002	0.002	0.003
Method[3] / Labs	Direct combustion	Peroxy-disulfate arsenite	Photometric	Combustion-iodate titration	Perchloric acid dehydration	Photometric	Photometric	$FeSO_4$-$KMnO_4$ titration		Distillation-titration
A	0.490	0.78	[a] 0.012 .011	0.011	0.280	[b] 0.075	[c] 0.064 [d] .074	0.946	[e] 0.181	0.013
B	.488	.788	[f] .012	.010	.283	[g] .074	[c] .068	.942	[h] .182	.012
C	.495	.785	[i] .012	.010	.28	[g] .075	[c] .070	.946	.184	.007
D	.489	[j] .78	[f] .011	.009	.287	[k] .072	.070	.944	.189	- - -
E	.490	[j] .790 .798	[f] .010	.009	[l] .284	[m] .076	.071	[n] .946	[o] .182	.009

*Combustion-Infrared results for sulfur = 0.0085 ± 0.0003 wt. %.

1. The certified value listed for a constituent is the *present best estimate* of the "true" value based on results of the cooperative analytical program for certification.
2. The estimated uncertainty listed for a constituent is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability for samples 0.5 g or more. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)
3. A detailed description of many of the methods of analysis employed in the certification program for this SRM may be found in Part 12, Annual Book of ASTM Standards.

[a] Alkali - molybdate.
[b] Alpha benzoinoxime gravimetric.
[c] Dimethylglyoxime precipitate titrated with cyanide.
[d] Gravimetric as NiO.
[e] Mercury cathode-$FeSO_4$-$KMnO_4$.
[f] Molybdenum-blue spectrophotometric.
[g] Diethyldithiocarbamate spectrophotometric.
[h] Potentiometric titration with $FeSO_4$-$K_2Cr_2O_7$.
[i] Ammonium phosphovanadate spectrophotometric.
[j] Periodate spectrophotometric.
[k] Finished by electrolysis.
[l] Sulfuric acid dehydration.
[m] Atomic absorption spectrometry.
[n] Chromium oxidized with peroxydisulfate and titrated potentiometrically with ferrous ammonium sulfate.
[o] Vanadium oxidized with HNO_3 and titrated potentiometrically with ferrous ammonium sulfate.

Washington, D.C. 20234
June 5, 1979
(Revision of Provisional Certificate dated December 23, 1966)

George A. Uriano, Chief
Office of Standard Reference Materials

(over)

PLANNING, PREPARATION, TESTING, AND ANALYSIS:

The material for this SRM was provided by the Timken Roller Bearing Company, Canton, Ohio, through the courtesy of E. R. Vance.

Chemical analyses for certification were performed in the following laboratories:

Latrobe Steel Co., Latrobe, Pa., J. M. Henderson.
Lukens Steel Co., Coatesville, Pa., J. H. Scott.
National Bureau of Standards, Center for Analytical Chemistry, Washington, D.C., J. R. Baldwin, R. K. Bell, B. B. Bendigo, E. R. Deardorff, E. J. Maienthal, T. C. Rains, and S. A. Wicks.
Timken Roller Bearing Co., Canton, Ohio, E. R. Vance.
Universal Cyclops Specialty Steel Division, Bridgeville Plant, Bridgeville, Pa., R. C. Host.

The overall direction and coordination of the technical measurements leading to certification were performed by J. K. Taylor and J. I. Shultz.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.